Manure Management and Utilization

Please note: Listed page numbers are relative to the 2008 GAAMPs and not the 2009 Draft

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III. ODOR MANAGEMENT

The goal for effective odor management is to reduce the frequency, intensity, duration and offensiveness of odors, and to manage the operation in a way that tends to create a positive attitude toward the operation. Because of the subjective nature of human responses to certain odors, recommendations for appropriate technology and management practices are not an exact science. The recommendations in this section represent the best professional judgment available.

Odor perception is a subjective response to what people detect, through their sense of smell, in the air they breathe. While there is no scientific evidence that odorous gases that escape from livestock operations are toxic at the concentrations experienced by neighbors, they can become an annoyance or a nuisance.

The following 14 management practices (#12-25) provide guidance on how to minimize potential odors from livestock operations. Producers should select those practices which are applicable to their livestock operations and develop an Odor Control Plan as part of their Manure Management System Plan (MMSP). See Appendix C for a sample MMSP that contains an example Odor Control Plan (section IX).

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Stacked Solid Manure

15. Solid manure that may contain bedding materials and/or is dried sufficiently, such as that from poultry, cattle, sheep, swine, horse, and fur-bearing animal facilities, can be temporarily stacked outside the livestock building.

Further review may be needed regarding environmental precautions needed with temporary storage practices.

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Composting

Composting is a self-heating process carried on by bacteria, actinomycetes and fungi that decompose organic material in the presence of oxygen. Composting of organic material, including livestock and poultry manures…...

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Anaerobic Methane Digesteers

Methane can be produced from ~~animal wastes~~ organic materials, including livestock and poultry manures by anaerobic digestion. This process converts the biodegradable organic

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Manure should not be applied to areas subject to flooding unless injected or immediately incorporated. Liquid manures should not be applied in a manner that will result in ponding or runoff to adjacent property, drainage ditches, or surface water. Therefore, application to saturated soils, such as during or after a rainfall, should be avoided.

Manure applications to crop land with field drainage tiles should be managed in a manner that keeps manure from reaching tile lines. Liquid manure has the risk of following preferential flow paths through cracks, worm holes, and other soil macropores to field drainage tiles. Liquid manure can also reach field drainage tiles when soils are saturated. This flow can result in a discharge of manure nutrients and contaminants to surface waters. Risks of manure entering field tile can be reduced by analyzing field conditions prior to land application of liquid manure such as tile location and depth, tile inlets, soil type, evidence of soil cracking and soil moisture holding capacity. Recent precipitation and forecasted precipitation should be considered.

Whenever possible, tile outlets should be observed before and after land application. Observations should note the flow rate, color, and odor to confirm that no flow of manure nutrients is occurring. Tile which is flowing prior to land application may be an indication that the soil is saturated. Land application to saturated soils should be avoided. Manure application rates and application methods should be based on field and weather conditions.

~~If not properly managed, applying liquid manure to soils may result in unintentional flow into field tile lines through soil macropores. Soil conditions, pre-application tillage and application rates can affect the potential for liquid manure to reach field tile lines. Application rates should be managed to keep manure within the soil. Guidance can be found in the USDA-MI-NRCS technical guide (NRCS-FOTG) and from MSU Extension.~~

Guidance and specific actions can be found in MSU Extension Bulletin WO-1037 (found at www.animalagteam.msu.edu) and in the USDA MI-NRCS technical guide (NRCS-FOTG). These actions are not a substitute for properly evaluating field and weather conditions as described above.

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APPENDIX C
SAMPLE MANURE MANAGEMENT SYSTEM PLAN (MMSP)
I. General Overview

Dairy farm is currently a partnership between a farmer and his two sons. The dairy currently has ~~200~~ 245 animal units (one animal unit equals 1,000 pounds), which includes lactating and dry cows, replacement heifers and calves. The land base of the operation is approximately 1,275 acres. ~~The typical c~~Crops grown on the farm are corn grain, corn silage, wheat, and alfalfa~~, and dry beans~~. The purpose of this plan is to indicate how manure produced on the farm is managed to meet the current Michigan Right-To-Farm management practices, while utilizing the nutrients for crop production, without causing any adverse environmental impacts. Currently, there are no plans of any future expansion of the operation.

Soil testing is being done on the crop fields to have current soil tests on hand. Soil testing will be done on any field, which does not have a current soil test (no more than three years old). Manure testing is planned for the spring of 2003 to obtain nutrient levels of the manure. ~~These m~~Manure tests ~~should~~ will be done at least three times during the first year to establish a base line and then at least once a year thereafter, or more often if ~~changes in~~ feed ~~concentrations have occurred.~~ rations or bedding types and quantities are changed.

II. Volume and Nutrient Production From All Sources

Table 1. Estimated Annual Volume and Nutrient Production From All Sources

Name of Manure Storage	**Numbers of Animals (Size)**	**Consistency/ Contents**	**Estimated Annual Manure and Nutrient Production** (values rounded)			
			Volume* (cu.ft)	**Total N (lbs)**	**P_2O_5**	**K_2O (lbs)**
Free Stall Barn	150 (1,400 lb)	Liquid/Sand	~~131,400*~~ 131,000	~~44,895~~ 44,900	~~22,995~~ 23,000	~~26,280~~ 26,300
Loafing Barn	50 (250 lb)	Solid/Straw	5,840~~*~~	1,460	~~365~~ 360	~~1,278~~ 1,280
Calf Barn	25 (150 lb)	Solid/Straw	~~1825*~~ 1820	~~456~~ 460	~~91~~ 90	~~365~~ 360
Open Heifers	25 (750 lb)	Solid/Straw	~~9,125*~~ 9,120	~~2,099~~ 2,100	~~639~~ 640	~~2,008~~ 2,010
Totals			~~148,190*~~ 148,000	~~48,910~~ 48,900	~~24,090~~ 24,100	~~29,931~~ 30,000

*~~This does~~These volumes do not include bedding. ~~You must add in~~ (If manure storage facilities are to be built, the ~~amount~~ volume of bedding ~~you would use~~ bedding that will be included with the stored manure will need to be determined in order to size the storage appropriately.)

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The manure produced is currently scraped daily ~~scraped~~ and hauled from the free stall barn and parlor. The heifer barns, calf barn, and loafing barn are dry packed for up to one month and sometimes two, if needed, due to weather conditions. See the attachments for the locations of manure storage and animal numbers per barn.

Straw bedding in the additional barns is also hauled to the fields with the manure when the barns are cleaned. Any spoiled feed is hauled and spread on crop fields.

III. Manure Collection

The free stall barn is scraped and hauled daily. This manure is scraped to a ramp where the manure spreader is parked below for loading. The milkhouse wastewater and parlor washwater are collected in a storage pond south of the parlor. Any manure in the parlor is scraped away prior to flushing with clean water. The flush water is also collected in the storage pond.

The manure from the young stock is dry packed in the corresponding barns (see attachment). All manure is under cover of the barns so polluted runoff is not a concern from the housed animals. The feed lot could be a potential source of polluted runoff, but any runoff ~~is~~ will be contained on the farm and not ~~moving~~ allowed to move off site.

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VII. Manure Utilization

Table 2. Estimated Annual Farm Nutrient Balance for Fields Receiving Manure

Crop Grown	Yield Goal	Acres (Typical Year)	Nitrogen (lbs)	Estimated Crop Nutrient Removal	
				P_2O_5 (lbs)	K_2O (lbs)
Corn	125 bu.	580	~~83,520~~ 62,200	~~26,825~~ 26,800	~~19,575~~ 19,600
Corn Silage	20 tons	70	~~13,160~~ 13,200	~~5,040~~ 4,620	~~10,920~~ 11,200
Alfalfa Hay ~~Si~~lage	20 tons	150	~~21,000~~ 42,000	~~4,800~~ 12,600	~~23,400~~ 36,000
Alfalfa Hay	10 tons	150	~~21,000~~ 67,500	~~4,800~~ 19,500	~~23,400~~ 75,000
Wheat	50 bu.	100	~~4,000~~ 6,000	~~3,100~~ 3,150	~~1,900~~ 1,850
Totals		1050	~~142,680~~ 191,000	~~44,565~~ 66,700	~~79,195~~ 144,000
Annual nutrient production from Table 1			~~45,920~~ 48,900	~~20,656~~ 24,100	~~30,918~~ 30,000
Nutrients needed to balance cropping system			~~-96,760~~ -142,000	~~-23,909~~ -42,600	~~-48,277~~ -114,000

The manure nutrients will be utilized as fertilizer in the production of the field crops. The manure will provide approximately ~~45,920~~ 48,900 lbs. of nitrogen, ~~20,656~~ 24,100 lbs. of P_2O_5 and ~~30,918~~ 30,000 lbs. of K_2O annually. The manure will be land applied after the harvesting of the crops and in the spring before planting, with daily spreading throughout the year.

The crop rotation will be a corn, hay, and wheat rotation. Refer to Table 2 for realistic crop goals and acres planted during a typical year. The soils on this farm are loamy sands and sandy loams with clay loam inclusions. The slopes on these fields run from 2% to 10%.

To help determine rates of manure that can be applied to individual fields, a list of fields is included showing the average Bray P1 soil test levels in Table 3. The fields have been grouped by those fields having Bray P1 lest levels <150 lb P/ac, 150-299 lb P/ac, and ≥300 lb P/ac. Fields having <150 lb P/ac will usually have manure applied to provide all of the N recommended for the crop and yield to be grown. To be in compliance with the Right To Farm GAAMPs, fields having soil test levels of 150-299 lb P/ac will receive manure P2O5 loadings equal to the P2O5 expected to be removed by the harvested crop, and fields with soil tests ≥300 lb P/ac will not receive any manure (currently, 225 of 1,275 acres will not be receiving manure applications; only 115 of the 225 acres are depicted in Table 3).

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Table 3. Field Identification Bray P1 Soil Test Results and Crops Grown*

Field Number	Acres	Bray P1 (lbs./ac.)	2003 Crop	2002 Crop
Fields with Bray P1 soil test levels <150 lb P/ac				
7	~~20~~40	~~192~~114	Corn	Corn
8	~~20~~80	~~192~~102	Corn	Corn
Fields with Bray P1 soil test levels 150-299 lb P/ac				
2	~~40~~60	~~114~~192	Corn	Corn
9	~~26~~80	~~96~~246	Corn	Hay
Fields with Bray P1 soil test levels ≥300 lb P/ac				
1	~~26~~75	~~84~~354	Corn	Hay
3	~~26~~40	~~100~~456	Corn	Hay

*For this example MMSP, only a partial listing of fields is included.

VIII. Manure Recordkeeping System (no edits)

IX. ~~Manure~~ Odor Control Plan

Odors from manure applications will be controlled by using the following practices:

- □ Avoid spreading during times when neighbors may be spending time outside, such as on holidays or weekends. ~~,unless manure is incorporated immediately after spreading.~~
- □ Avoid spreading during hot humid days when the air is heavy and still (a breezy day will help disperse and dilute odors more rapidly).
- □ Manure is incorporated immediately or at least within 48 hours of application.

Odors from the facility will be controlled by using the following practices:

- □ Install visual screen via tree lines or fence rows to contain odors and reduce complaints from neighbors.
- □ Clean water will be diverted to help keep the facility dry.
- □ A cover will be kept on the silage or it will be kept in “Ag Bags”.

THE FOLLOWING ITEMS ARE OPTIONAL, BUT ARE STILL GOOD IDEAS TO INCLUDE IN YOUR PLAN:

X. Community Relations:

In order to develop and maintain a positive relationship with the entire community, the following steps are planned:

- □ Keeping the farmstead area esthetically pleasing will continue to be a high priority.
- □ Each spring, a farm newsletter will be sent to all appropriate community members describing farm activities, personnel, and management.

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- □ A community picnic and farm tour will be held at least semi-annually for all in the immediate community and manure application areas.
- □ Example Dairy Farm will make itself available to local schools for farm visits as field trips or school projects as appropriate.
- □ We will seek to participate in local community events and youth activities, such as the local town festival and youth athletic teams.
- □ Additional opportunities to strengthen community relations will be considered whenever they arise.

(The above list of community relations practices may be longer than most farms find necessary, but it provides several examples that farms might consider.)

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IX. ~~X.~~ Emergency Manure Spill Plan

Points that should be covered:

- □ Detailed procedure to be used in the event of a spill, e.g., listing contact people and notification phone numbers;
- □ Include the Michigan Department of Agriculture Ag Pollution Hotline (800) 405 0101;
- □ Plan for spills that might happen at various places including a breach of the storage structure, at loading, during transport, and in the field;
- □ A large part of the Manure Spill P~~p~~lan should have to do with prevention and monitoring, e.g., maintaining a minimum freeboard in your manure storage to prevent overflows, mowing manure storage berms and inspecting for burrowing animal activity periodically to prevent manure releases; and
- ~~□ Maintain a minimum freeboard in your manure storage to prevent overflows;~~
- ~~□ The manure storage berms are mowed and inspected for burrowing animal activity periodically to prevent manure releases; and~~
- □ Include a f~~F~~arm map ~~including~~ showing all structures at the farmstead.

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X. ~~XI.~~Veterinary Waste Disposal

Explain how v~~V~~eterinary waste will be disposed of by the attending veterinarian~~.~~, e.g.,

- □ Any veterinary waste generated from farm medicating will be disposed of by having it picked up by a sanitary waste disposal company (residential trash removal).

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- Any sharps (e.g. needles) will be placed in a closed container (such as an empty plastic bleach bottle, water bottle, juice bottle, etc.) to prevent needle pricks from occurring to any potential handler of the waste.

XI. ~~XII.~~ Mortality Disposal

Explain how dead animals will be handled, e.g.,

- Dead animals will be picked up by a rendering service within 24 hours.
- If animals are going to be buried, the Michigan Bodies of Dead Animals Act will be consulted for proper burial procedures.

XII. Conservation Plan

~~Conservation tillage is the primary tillage used. No-till is currently being considered.~~

Points ~~to~~that should be ~~C~~covered:

- Farm field soil conservation measures being used, such as conservation tillage, no till, and grass filter strips;
- Storm water runoff control measures, such as berms, retention basins, and infiltration strips;
- Runoff from driveways, silo aprons, and open feed lots; and
- Measures used to keep clean roof runoff out of manure.

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